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October 29, 2003  
Commissioner Robert Pernell  
Commissioner Arthur Rosenfeld  
California Energy Commission  
1516 Ninth Street  
Sacramento, CA 95814

**Re: HCD Comments on Proposed Title 24, Part 6, 2005 Amendments**

Dear Commissioners,

The purpose of this letter is to respond to the comments submitted in a letter dated September 23, 2003 from Norman Sorensen of the Department of Housing and Community Development (HCD) regarding the proposed 2005 amendments to the California Building Energy Efficiency Standards. HCD has raised many issues associated with the proposed changes and I will try to address each of these comments and explain the rationale for each proposed amendment. Several of HCD's comments are related to measures that were researched and developed by PG&E's Codes and Standards program.

As HCD has noted throughout the letter, the Standards must be cost-effective when taken in their entirety. PG&E strongly supports the concept that measures required by the standards need to be cost-effective, technically sound and readily available.

Each efficiency measure proposed by PG&E has undergone extensive research and public review to ensure it meets this minimum cost-effectiveness requirement to be considered for the new building efficiency standards. The technical and economic analysis behind each of these proposals can be found on the Commission's website: [http://www.energy.ca.gov/2005\\_standards/documents/](http://www.energy.ca.gov/2005_standards/documents/)

In responding to Mr. Sorensen's letter, I will respond to each comment and use the numbering system in his original letter. The responses below are only for the efficiency measures proposed and analyzed by PG&E and its contractors.

**Comment 3 Residential Hardwired Lighting**

*HCD is concerned with construction cost and that lighting requirement is truly cost-effective.*

*Issue #1 Concern that the requirements constitute a new method for determining high efficiency in light fixtures and lighting systems.*

The units (lumens per watt) is the same as in Section 150(k) of the current standards for kitchen lighting. The proposed amendment clarifies that ballast wattage is not counted

in calculating lumens per Watt, resulting in a simplification of the calculation relative to the current Standards.

*Issue # 2 CBIA's estimate for first cost is \$400 per dwelling unit.*

CBIA's estimate assumes that builders are not complying with the current standards. The current standards require all general lighting in the kitchen to be fluorescent. There have been interpretations of this requirement, which the Energy Commission has deemed noncompliant. For example: the requirement has been incorrectly interpreted to mean that one or two recessed cans out of six or eight in a typical kitchen need to be compact fluorescent. Another incorrect interpretation has been that the lighting installed in the kitchen ceiling can be incandescent as long as the under cabinet lighting is fluorescent. If costs for compliance with current kitchen lighting standards are backed out of CBIA's estimate, the additional cost due to the new Standards is only \$212 per dwelling unit. Nevertheless, to ensure our estimates remained very conservative, we assumed \$400 initial cost for the cost-effectiveness calculations.

*Issue # 3 The \$400 incremental cost figure represents cost for materials only.*

Installing high efficacy lighting requires the same labor as lower efficacy lighting. The only difference between high efficiency lighting is that it uses fluorescent sources while lower efficacy lighting uses incandescent lamps. Therefore there is no additional labor cost.

*Issue # 4 The costs used by these sources do not include additional costs a homebuyer will incur with financing the additional debt.*

Since the cost-effectiveness analysis includes a discount rate this explicitly includes the cost of financing (time value of money).

However, the following financial analysis was performed to illustrate the positive effect on the homeowner's cash flow. The following calculation shows that even in the first year, when 100% of the additional down payment is made, there are net savings to the homebuyer. This analysis is conservative because it uses the average cost of electricity \$0.14/kWh rather than the top tier of electricity cost which would be saved in an inverted block rate that most consumers pay.

Installing high efficacy lighting saves approximately 511 kWh/yr and at an electricity rate of \$0.14/kWh this saves \$71.40/yr. The calculation assumes the homeowner finances the incremental first cost of \$400 as follows: at a 10% down payment percentage, this increases the down payment by \$40, the remaining \$360 is financed at a 7% nominal interest rate (7.2%) which adds \$2.40 to the monthly mortgage payment. Thus the homeowner's first year costs are  $\$40 + (\$2.40 \times 12)$ , or \$68.80, resulting in a net savings of \$2.60 the first year and  $\$71.40 - (12 \times \$2.40) = \$42.60$  each year for the next 29 years.

**Comment 4: ICAT recessed lights**

*The 'air tight' requirement would result in additional costs to the installer by having to reinstall fixtures after being inspected, as well as additional time delays.*

Insulated ceiling air-tight (ICAT) recessed cans are currently required by the Washington State Energy Code, the 1995 Model Energy Code (MEC) and its successor, the 2000 International Energy Conservation Code (IECC). As a result, the energy codes in 26 states require ICAT fixtures.<sup>1</sup> Inspectors in these 26 states have easily been able to make inspections of homes with ICAT fixtures. ICAT fixtures are labeled as such on the inside of the fixture so there is no need to remove the fixture for inspection and reinstall it after inspection.

In terms of cost-effectiveness of the air-tight feature, the benefit/cost ratios varied depending upon the climate and ranged from 1.7 in the mild climate of San Diego to 8.7 in the extreme climate of Shasta. In the Central Valley the benefit /cost ratios were around 5 to 1. In a mature market where all fixtures are required to meet the Standards, the added cost for the air-tight fixture is expected to be negligible; that has been the experience in the Pacific Northwest. The analysis of this measure can be found in the PG&E sponsored "Code Change Proposal for Hard Wired Lighting" found on the CEC website: [http://www.energy.ca.gov/2005\\_standards/documents/2002-05-30\\_workshop/2002-05-17\\_HARD-WIRE\\_LT.PDF](http://www.energy.ca.gov/2005_standards/documents/2002-05-30_workshop/2002-05-17_HARD-WIRE_LT.PDF)

#### **Comment 6: Cost-Effectiveness Federal Appliance Standards:**

*Concern that homeowner recovers incremental cost of SEER 12 unit when unit lasts 18 years and cost-effectiveness analysis is over 30 year period.*

The CEC has no control over the Federal appliance standards. Historically, appliance prices for what was previously a premium product fall dramatically when that product becomes the minimum complying product. Based on the annual energy savings the present worth of the energy savings for an 18 year LCC would be \$1,082 to \$2,455. At an 18 year life span, the savings are still greater than HCD's estimate of a \$1,000 incremental cost at today's market conditions.

#### **Comment 10: 152(a)2B Duct sealing and insulation in additions**

*Concerns raised about the cost-effectiveness of requiring R-8 insulation and testing and sealing when ducts are extended.*

When ducts are extended into an addition the prescriptive path requires that the ducts be sealed to 15% leakage. This is based on the current requirement adopted in 2001 that new ducts be as well sealed as ducts in a new home. New homes are sealed and tested to a 6% maximum leakage value. However duct testing tests the entire duct system and thus a higher leakage rate is allowed for the entire duct system.

New ducts have prescriptive R-value requirements. However, there is NOT a requirement to insulate the existing duct system when adding new ducts.

Also note that tested ducts are sampled by the HERS rater on a sampling regimen of 1 test per 7 systems receiving duct sealing. This reduces costs significantly.

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<sup>1</sup> source McCulloch Pacific Northwest Laboratory presentation  
[http://www.energystarpartners.net/meetings/Wednesday\\_Sessions/Overview\\_Lighting\\_Design\\_Competitions/6](http://www.energystarpartners.net/meetings/Wednesday_Sessions/Overview_Lighting_Design_Competitions/6)

Sealing ducts does add installation cost to the building but the benefit cost ratios of this measure range from 2 to 11 in the climate zones considered. This results in housing that is far more affordable to own and operate than housing with leaky duct systems.

### **Comments 5, 9 and 11 – Fenestration requirements**

*The HCD letter raised concerns about revised U-factor requirements requiring more expensive windows.*

There appears to be a misperception that the switch to the new NFRC rating system makes compliance with the new standards more difficult and therefore more costly. Under the new NFRC ratings, a dual glazed aluminum framed product with low solar gain, low emissivity glass would typically have a U-factor rating around 0.57, where under the old NFRC ratings; this product would typically have a rating around 0.65. The standards and the default tables were altered to recognize the fact that the new NFRC ratings result in lower U-factors. There is no change in stringency and therefore no additional cost. The prescriptive values remain based on an aluminum framed product.

Here's an example to illustrate the concept. In climate zone 6, the description of a compliant product is "a dual glazed aluminum framed product with clear glass". Under the new NFRC ratings, this product would typically have a U-factor rating of 0.67, where under the old NFRC ratings, the value would have been 0.75.

### **HCD Recommendation 5**

HCD's comments seem to indicate that the standard requires 20% glass area so their cost estimate is based on increasing the glass area. Builders may increase glass areas in the affected climate zones (1,2,5,11-16), but they are not required to do so.

### **HCD Recommendation 9**

With regards to additions, HCD's comments seem to imply that there is a large difference between the 2001 standards 0.75 U-factor prescriptive criteria and the proposed 2005 switch to referencing the package value. This is not the case in practical terms because the product that required is the same under both the 2001 and 2005 standards. The issue of alterations, where replacement windows are now covered, is discussed under HCD Recommendation 11.

The reason that this switch does not impact the stringency much is due to 1) the change in NFRC ratings described above; and 2) the fact that both standards have the same 0.40 SHGC requirement that is most often satisfied with the use of low solar gain, low emissivity glass in cooling climates (2,4,7-15). A side benefit of using low solar gain, low emissivity glass is that the U-factors are also typically 0.08 lower. Stated another way, an aluminum framed, dual glazed product with low solar gain, low emissivity glass will typically have a U-factor that meets the new requirements when the new NFRC rating system is considered.

The main reason this change was proposed is to standardize the requirements for each climate zone for all fenestration products and not to increase stringency for new construction or additions.

Some additional points:

1. HCD mentions concerns over CC&Rs. In cases where this concern is applicable, it is in fact unchanged from the 1993 standards when the 0.75 U-factor requirement was first imposed (this is a U-factor that requires dual glazing). This has not emerged as an issue in the past ten years.
2. Matching the appearance of older windows to newer windows is always difficult with or without an energy standard. For example, many homes built in the 1950's have steel framed windows that are no longer available in the market. Also, finishes have changes over the years on aluminum windows from mill to anodized to white paint. Matching older, faded or damaged colors is also difficult.
3. Exactly matching the existing windows would require the same frame, finish and glass options. Most people want a more efficient window when doing remodeling (they want to switch from single glazing to dual glazing) already making exactly matching existing single glazed windows difficult. According to AAMA 2000 survey data, nationwide more than 90% of the windows have dual glazing and more than 40% of the windows have low emissivity glass. Consumers are already choosing a more efficient window over one that exactly matches existing construction in additions.
4. The Performance approach is always available in cases where trading off the prescriptive requirements is desired.

## **HCD Recommendation 11**

With regard to alterations, HCD's comments address two separate issues.

In cases where there is added fenestration area, the 2001 standard requires a 0.75 U-factor and in cooling climates a 0.40 SHGC. For these cases, the discussion above on HCD Recommendation 9 is applicable.

In alterations where existing fenestration products are being replaced, the requirement that the prescriptive package be met is a new requirement. Some thoughts on this include:

1. See the comments of Cardinal Glass Industries on some of the reasons and comments that were made during this standards-setting process and during AB970 supporting the inclusion of requirements for replacement windows in the standard.
2. This is a case where the general discussion of the change in NFRC ratings applies. See comments on NFRC ratings above. The standard is based on aluminum framed double glazing. All double glazed windows regardless of frame type can meet these requirements.
3. The cost effectiveness of requiring that replacement windows meet prescriptive package requirements was described in the Case Study on replacement windows completed for the May 2002 workshop.
4. On window replacements, often the cost of the installation is far higher than the relatively minor cost of upgrading the glazing in the window product. Thus the added cost of the efficiency upgrade required by this proposed change is a small portion of the total cost.

5. See items #3-5 on the response to HCD Recommendation 9 for comments on the CC&R issue.
6. It is clear that a common replacement technique is to replace all windows in a home so that the issue of matching existing products is not applicable in these cases.
7. There is nothing in the proposed standard that requires the homeowner to upgrade all windows.
8. The Performance approach is always available in cases where trading off the prescriptive requirements is desired

**Comment 12: High price of sealing ducts**

*HCD had received a quote for duct sealing that is significantly higher than the cost used in the cost-effectiveness calculations.*

The costs used in the cost effectiveness calculations were obtained from a large sample of price quotes and not just from a single source. Prices for duct sealing can vary so the decision was made to not require duct sealing in climates where the estimated energy savings was less than twice as much as the estimated cost. HCD's estimate of the rating cost of \$25 to \$50 per house is in the same range as the \$30 per house cost used in the cost-effectiveness analysis. Actual costs are expected to be considerably less due to sampling.

We appreciate the concerns that Mr. Sorensen and his staff have brought forth about the proposed amendments. The key concern appears to be regarding whether or not the proposed amendments are cost-effective. The extensive research and public review shows that when factoring in the operating cost savings as well as initial investment, the proposed changes will improve rather than diminish the affordability of housing.

Please contact me if any further questions or need for clarifications arise.

Sincerely,

**(Original signed by Misti Bruceri)**

Misti Bruceri,  
Codes and Standards Program, Residential Standards Lead  
Pacific Gas and Electric Company